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Wormholes supported by a kink-like configuration of a scalar field

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Abstract

We study the problem of existence of static spherically symmetric wormholes supported by a kink-like configuration of a scalar field. With this aim we consider a self-consistent, real, nonlinear, nonminimally coupled scalar field φ in general relativity with the symmetry-breaking potential V (φ) possessing two minima. We classify all possible field configurations ruling out those for which wormhole solutions are impossible. Field configurations admitting wormholes are investigated numerically. Such configurations represent a spherical domain wall localized near the wormhole throat.

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